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ABSTRACT

Meaningful Internet activities should take advantage of the distance, multiple resources, and speed that telecommunications can offer. They should also require K-12 students to synthesize, analyze, and evaluate the information, rather than simply collecting facts. This paper focuses on basic, advanced, and original research activities of the Internet. Basic research refers to retrieving information from a single, often preselected, online source; advanced research includes a wider variety of sources and involves high-order thinking skills; and original research focuses on using the Internet to conduct investigations through surveys and collaborative experiments. Alternatives to online research are examined and a six-step procedural model is proposed for conducting relevant and meaningful Internet activities. The online research model consists of: (1) questioning; (2) planning; (3) gathering (online); (4) sorting & sifting; (5) synthesizing; and (6) evaluating. (Author/SWC)

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Paper

An Internet Research Model

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Abstract

This paper focuses on basic, advanced, and original research activities of the Internet. Basic research refers to retrieving information from a single, often preselected, online source; advanced research includes a wider variety of sources and involves high-order thinking skills; original research focuses on using the Internet to conduct investigations through surveys and collaborative experiments. Alternatives to online research are also examined and a model is proposed for conducting relevant and meaningful Internet activities.

Introduction

Meaningful Internet activities should take advantage of the distance, multiple resources, and speed that telecommunications can offer. They should also require students to synthesize, analyze, and evaluate the information, rather than simply collecting facts.

Telecommunications projects for K–12 classrooms can be roughly divided into two broad areas—communication and research. Communication-oriented projects include activities such as pen-pals, peer-to-peer tutoring, and electronic publishing (Barron & Orwig, 1995). Advantages of communicating through the Internet include the facts that the costs are minimal and responses to messages can be relatively fast and frequent. Through the Internet, students can interact directly with people throughout the world on a daily basis to gain insights on culture, politics, and living styles.

The Internet is also an enormous resource for educational research activities. With access to international databases, libraries, and experts, students can find and retrieve information on almost any topic. Research-oriented projects include basic, advanced, and original information gathering. This paper focuses on the research activities of the Internet and proposes a model for conducting relevant and meaningful Internet activities.

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Alternatives to Online Research

Before jumping into an online research project, it is wise to consider the alternatives. In many cases, investigations through other media, such as traditional libraries, CD-ROM, or video may be more appropriate and more efficient.

The use of online resources need not replace the use of libraries, bookstores, and magazine racks. Textbooks and magazines are often easier to transport, have more reliable content, and include higher quality graphics. In addition, many students prefer to read print that is in hard-copy form with a variety of fonts, styles, and colors.

Conducting research with CD-ROM encyclopedias or databases also has some advantages over conducting research on the Internet. CD-ROMs usually provide a better interface than the Internet, and they can tailor the content to a specific grade level or subject area (Caputo, 1994). In addition, the information is self-contained, and you do not have to worry about students wandering off to information that is inappropriate for young minds.

If the investigations require large amounts of video, a videodisc or videotape may be most appropriate. Although multimedia components are available on the Internet, the transfer time required is considerable and the quality is limited. In most cases, the video clips on the Internet are limited to less than two megabytes and display at less than 15 frames per second in a window that is less than one quarter of the screen. Even with these limitations, it might take 15 minutes or more for a movie that lasts only 15 seconds to download and play on your computer.

Basic Research

Students' initial uses of the Internet will generally involve basic research, which is focused on retrieving information from a single, often preselected, online source. For example, students may participate in an "Internet Hunt" designed by their teacher to practice accessing a Telnet site, or they may access a preselected source, such as the *CIA World Factbook*, to write a research report (Barron & Ivers, 1996).

Basic research provides opportunities for students to learn navigation techniques and to practice different approaches for information retrieval. Time invested in the teaching and practice of the basic skills is especially important for inexperienced researchers. A lot of the frustration associated with initial uses of the Internet can be alleviated with short, structured exercises that help to ensure success.

Example Activities:

- Internet "Treasure Hunts"
- Crossword Puzzles that focus on a few, pre-selected Internet sites
- "Trivial Pursuit" exercises with the Internet
- Research papers that incorporate one or two Internet sites

Advanced Research

Advanced research includes a wider variety of sources (such as several sites on the Internet in addition to print or CD-ROM sources), and the sites are not generally preselected. With advanced research, the students must determine which source or sources should be investigated and have the skills to access and query the sources. Search engines, such as Veronica, Archie, Lycos, and WebCrawler, are important to help students in the search for materials.

In addition to locating the correct information, with advanced research students should be required to analyze the results of their searches, compare the data, and report

the information appropriately. They should also begin to question the resources and reject incomplete, inaccurate, or inconsequential information (Barron & Ivers, 1996).

Examples:

- Conduct research about the Holocaust
- Investigate information available about rain forests
- Write a research report about endangered species

Original Research

Original research refers to using the Internet to conduct investigations through surveys and collaborative experiments. The power of original research lies in the fact that the participants can include students, teachers, and community members from all over the world. For example, students may send a survey through a LISTSERV, newsgroup, or e-mail system to collect and compare gas prices, hobbies, school topics, or politics. After the data are collected, they can be graphed, analyzed, and shared with all participants.

Students can also participate in cooperative experiments through the Internet. For example, students in different geographical areas might compare the air quality, chemicals in rivers, soil content, or growth patterns of plants. When conducting collaborative experiments with students in other countries, it is important to ensure that all factors influencing measurements are controlled as much as possible. For example, some locations may have better access to scientific instruments and computers than others. If you plan to compare air quality, it might be necessary to send the same testing equipment to all locations. Through international collaborative experiments, students will learn that some countries use the metric system and others do not, and that electrical currents may be different.

Examples:

- Compare the gasoline prices in various countries or states
- Conduct tests of water samples or air quality in various countries or states
- Analyze ancestry and migration patterns based on biographies

Online Research Model

The procedure for conducting research through the Internet is very similar to traditional research, except that the amount of information available is enormous and online time may be limited. In 1990, Eisenberg and Berkowitz outlined a six-step research cycle for information problem-solving. A similar cycle is very appropriate for Internet searches (see Figure 1).

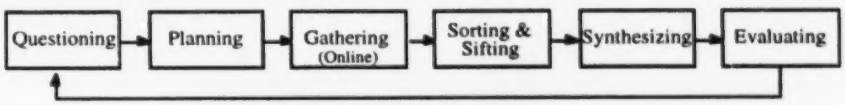

Figure 1. Internet Research Cycle.

1. *Questioning.* Students should structure their research questions and determine their topics of interest before they go online. "Online is the best thing to come down the line in years in the educational field, because it teaches kids to think. For the first time, they have to ask themselves what it is they're really looking for" (Basch, 1993, p. 184). If the research questions are not well-formulated, the students will have little chance of finding relevant information.

2. *Planning*. With careful planning, valuable time and energy can be saved when the students get online. They should narrow their research questions, select potential sites, and outline a search strategy.
3. *Gathering*. Next, the students connect to the Internet to retrieve the information. There is a tremendous amount of information on the Internet and it is easy for students to acquire mountains of extraneous data. Students should be taught to quickly assess the potential relevance of the information before capturing or downloading it.
4. *Sorting & Sifting*. After the students have collected the information, they should sign off the system and carefully analyze the information. This step can take a substantial amount of time because the information must be categorized, accepted, or rejected. Another important component of this step is for students to assess the reliability and validity of the information. "The Internet is far from perfect. Largely unedited, its content is often tasteless, foolish, uninteresting, or just plain wrong" (Elmer-DeWitt, 1995, p. 10). Figure 2 includes some possible data sources on the Internet and important questions to consider in relation to the validity.

	Newsgroup	LISTSERV	Database	Electronic Journal	FTP site
Source	Individuals	Individuals	Institutions	Publishers	Individuals
Edited?	No	No	Usually	Usually	No
Refereed?	No	No	Sometimes	Usually	No
Available in Print?	No	No	Sometimes	Usually	No

Figure 2. Sources of Information.

5. *Synthesizing*. After the relevant information is selected, the students should attempt to form some conclusions through the integration of the data that addresses the research questions.
6. *Evaluating*. Finally, students analyze the information to determine if the research question has been adequately answered. In many cases, additional research may be necessary, and the cycle will begin again, with a revised research question and additional sites to search (McKenzie, 1995).

Conclusion

Basic, advanced, and original research projects can provide relevant and meaningful ways for your students to learn the basics of search and retrieval techniques and to acquire information on a variety of subjects. Before considering online research, other alternatives should be investigated. When online is the most appropriate option, it should be implemented in a procedural fashion to ensure maximum benefit for the students.

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